Naples Quadrangle, Maine

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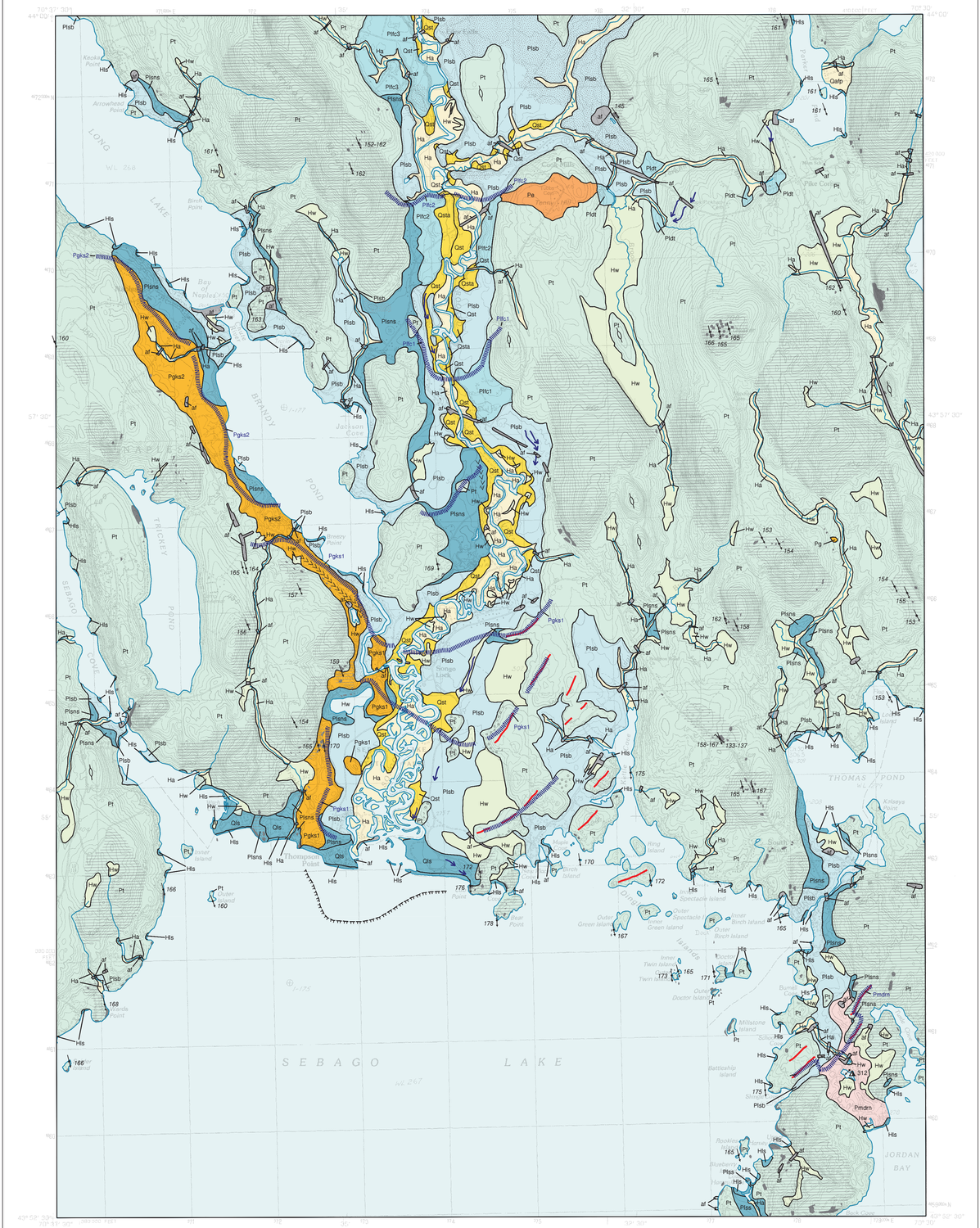
Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping by Carol T. Hildreth completed during the 1995 field season; funding for this work provided by the U.S. Geological Survey STATEMAP program.

Quadrangle Location

SCALE 1 : 24,000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Naples quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not impute responsibility for any present or potential effects on the natural resources.

af **Artificial fill -** Man-made. Material varies from natural sand and gravel to quarry waste to sanitary landfill; includes highway and railroad embankments and dredge spoil areas. This material is mapped only where it can be identified using the topographic contour lines. Minor artificial fill is present in virtually all developed areas of the quadrangle. Thickness of fill varies.

Ha **Stream alluvium** (Holocene) - Sand, silt, gravel, and muck in flood plains along present rivers and streams. As much as 3 m (10 ft) thick. Extent of alluvium indicates most areas flooded in the past that may be subject to future flooding. In places, this unit is indistinguishable from, grades into, or is interbedded with freshwater wetlands deposits (Hw), especially in the Crooked and Songo River flood plains.

Hw **Freshwater wetlands deposit** (Holocene) - Muck, peat, silt, and sand. Generally 0.5 to 3 m (1 to 10 ft) thick. In places, this unit is indistinguishable from, grades into, or is interbedded with stream alluvium (Ha), especially in the Crooked and Songo River flood plains.

Hls **Modern beach deposit -** Sand and/or gravel with silt in places. Developed along the present and prehistoric shorelines of lakes and ponds. Most extensive and thickest on larger lakes; 0.5 to 2 m (1 to 6 ft) thick. May include sand dune deposits.

Qst **Stream terrace deposit** (Holocene and Late Pleistocene) - Sand, silt, gravel, and occasional muck on terraces cut into glacial deposits in the Crooked and Songo River valleys. In places, two to four distinct terrace levels exist. They are all lumped into one unit here, except for those of the highest level (Qsta) along one stretch of the river valley. These terraces formed in part during late-glacial time during the draining of glacial Lake Sebago. From 0.5 to 5 m (1 to 15 ft) thick.

Qls **Ancient beach deposit** (Holocene and Late Pleistocene) - Sand and/or gravel with silt in places. Developed along the shoreline during the draining of glacial Lake Sebago. Deposits are 0.5 to 2 m (1 to 6 ft) thick. May include sand dunes in places. Contemporaneous with unit Qst.

Qsta **Upper stream terrace deposit** (Holocene and Late Pleistocene) - Sand, silt, gravel, and occasional muck on terraces cut into glacial deposits in the Crooked River valley. Formed in part during late-glacial time during the early stages of the draining of glacial Lake Sebago. These terraces are distinctly higher than those of Qst.

Qafp **Fan deposit in Parker Pond** (Holocene and Late Pleistocene) - Sand, gravel, silt, and muck in a fan-shaped deposit on the east shore of Parker Pond. Fan may have began to form before glacial ice melted out of the pond, but it continued to develop as an alluvial fan delta afterward. Thickness estimated to be 0.5 to 5 m (1 to 15 ft).

Pe **Eolian deposit** (Pleistocene) - Fine- to medium-grained, well-sorted sand. Found as small dunes on a variety of older glacial deposits (shown by dotted pattern in areas where relatively abundant but thin and equal to or less than 1 m (3 ft) thick). One hilltop south of Cook Mills is capped by an extensive and thick dune field, where deposits are as much as 3 m (10 ft) thick. Deposited after glacial Lake Sebago level regressed from the area and left many fine-grained lake-bottom sediments exposed to wind erosion and transport before vegetation established itself and anchored the deposits. Partly contemporaneous with Qst, Qb, and Qfup deposits.

Plsns **Glacial Lake Sebago shoreline and nearshore deposits** (Pleistocene) - Sand, gravel, silt, and mud. Undifferentiated beach and nearshore deposits formed by wave action reworking glacial deposits. Includes spits, such as the two east and west of Songo Lock, and small, well-washed gravelly beach deposits. Also includes deposits reworked during draining of glacial Lake Sebago. Thickness varies from <0.5 m to >7 m (1-20 ft).

Plsb **Glacial Lake Sebago bottom deposit** (Pleistocene) - Massive to stratified and cross-stratified sand (generally fine- to medium-grained) and massive to laminated silt and silty clay. May contain boulders and gravel. Found as a blanket deposit over bedrock and older glacial sediments. Deposited at bottom of glacial Lake Sebago during late-glacial time. Variable thickness, generally 0.5-18 m (1-60 ft). A monitoring well in this unit along Thompson Point Road has 7 m (23 ft) of sand deposited over 9 m (28 ft) of sand and clay over 4 m (12 ft) of sand, clay, and gravel. A nearby seismic line shows 40.5 m (133 ft) to bedrock. This unit occupies the lowest elevations in the quadrangle, extending under the large lakes. Includes silt-clay varves. Worm tracks occur on the surfaces of some of the varve beds.

Plss **Glacial Lake Sebago shoreline, nearshore, and bottom deposits** (Pleistocene) - Undifferentiated deposits formed in Glacial Lake Sebago.

Plfc **Glaciofluvial and glaciolacustrine fan deposits of the Crooked River valley** (Pleistocene) - Sand, silt, and minor gravel, deposited in contact with or beyond adjacent ice as ice-channel fillings, kame-terrace or kame-delta deposits, and most commonly as lacustrine fan deposits laid down by meltwater that flowed south into glacial Lake Sebago. Differentiated from surrounding similar materials by evidence of ice contact, including faults and/or kettle holes, as well as thick foreset bedding (greater than 9 m [30 ft]). The only deposit that built above the level of glacial Lake Sebago, essentially as a kame-terrace delta, was $Plfc_4$. The head of outwash for $Plfc_3$ is along the west edge of the Crooked River valley at an elevation of 116+ m (380+ ft) just north of the quadrangle border near Tea Swamp in the Casco quadrangle. The head of outwash for $Plfc_2$ is near the intersection of Crooked River and Mill Brook at an elevation of 109+ m (330+ ft). The head of outwash for $Plfc_1$ is just north of the Route 302 road crossing at an elevation of 95+ m (310+ ft). Depressions in the surfaces of all these deposits, some of which are kettle holes, are filled with silt-clay varves as much as 9 m (30 ft) thick.

$Plfc_3$ Lacustrine fan, kame-terrace, and kame-delta deposits as much as 18 m (60 ft) thick.
$Plfc_2$ Lacustrine fan deposits as much as 24 m (80 ft) thick.
$Plfc_1$ Lacustrine fan deposits as much as 30 m (100 ft) thick.

Ptlt **Glaciofluvial and glaciolacustrine fan-delta deposits of Tarklin Brook** (Pleistocene) - Sand, silt, and gravel deposited in contact with or beyond adjacent ice as kame-delta or fan-delta deposits from meltwater flowing directly from the ice and/or meteoric waters flowing down the late-glacial Tarklin Brook into an arm of glacial Lake Sebago. The fan-delta surfaces are 100 to 107+ m (330 to 350+ ft) in elevation. These deposits appear to be contemporaneous with $Plfc_2$ and $Pgks_2$, and some of the surface material may be dune sand blown in after the lake level dropped. Thickness estimated to be 0.5 m (1 ft) to greater than 6 m (20 ft).

Pgks **Glaciofluvial and glaciolacustrine kame-terrace deposits of the Songo River valley** (Pleistocene) - Sand, gravel, and silt deposited in contact with or beyond adjacent ice as ice-channel fillings, kame-terrace deposits, and kame-delta deposits by meltwater that flowed down the west side of the Songo River valley. Contains kettle holes. Divided into two separate units: $Pgks_2$ has a head of outwash west of Naples village at a maximum elevation of 107+ m (350+ ft), and $Pgks_1$ has a head of outwash near Songo Lock at 104+ m (340+ ft) elevation. Deposits in both units have been reworked by wave action of glacial Lake Sebago. For example, notice spit in Plsns deposits around south end of large horseshoe-shaped kettle hole in unit $Pgks_1$ southwest of Songo Lock.

$Pgks_2$ Kame-terrace and kame-delta deposits. As much as 12 m (40 ft) thick.
$Pgks_1$ Ice-channel fillings, kame-terrace, and kame-delta deposits. As much as 24 m (80 ft) thick.

Pg **Uncorrelated glacial stream deposit** (Pleistocene) - Sand, gravel, and minor silt laid down by glacial streams in contact with or beyond adjacent ice as small isolated kame-terrace or kame-delta deposits above the glacial Lake Sebago level in the eastern part of the quadrangle. As much as 3 m (10 ft) thick.

Pmdrn **Glaciomarine? delta and fan deposit on Raymond Neck** (Pleistocene) - Sand and gravel and minor silt deposited as ice-contact marine delta and/or submarine fan deposits. The upper 3 ft (1 m) of the deposit is composed of cobbles, pebbles, and boulders that resemble a lag gravel, so the topmost material may have been reworked somewhat by wave action. Deposits are as much as 15 m (50 ft) thick.

Pt **Till** (Pleistocene) - Light- to dark-gray, nonsorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; a predominantly sandy diamicton containing some gravel. Thickness varies and generally is less than 6 m (20 ft), but is probably more than 24 m (80 ft) under the crest of most drumlins. See Site 11 on materials map for detailed description of one exposure.

NOTE: A very thin, discontinuous layer of windblown sand and silt, generally mixed with underlying glacial deposits by frost action and bioturbation, is present near the ground surface over much of the map area but is not shown.

Bedrock exposures. Not all individual outcrops are shown on the map. Gray dots indicate individual outcrops; ruled pattern indicates areas of abundant exposures and areas where surficial deposits are generally less than 3 m (10 ft) thick. Mapped in part from aerial photographs, soil surveys (Hedstrom, 1974), and previous geologic maps (Thompson and Smith, 1977).

Contact - Boundary between map units. Dashed where very approximate.

Scarp. Topographic boundary between stream terrace and modern flood plain, adjacent stream terraces, or different levels of erosion or deposition on other deposits. Hachures on downslope side.

Direction of glacial meltwater or meteoric water flow over outwash or till deposit.

Glacial striation. Point of observation is at dot.

Two directions of glacial striations and /or grooves on same outcrop. Flagged arrow indicates the earlier of the two.

Drumlin form. Glacially streamlined hill. Symbol indicates general direction of former ice movement.

Delta of unsertain origin. Formed near inland limit of late-glacial marine submergence. May be lacustrine or marine. Number indicates approximate altitude (in feet) of former water surface.

Crest of esker or ice-channel filling. Shows trend of sand and gravel ridge deposited in meltwater tunnel within or beneath glacier. Chevrons point in inferred direction of former meltwater flow.

Area of many large boulders that may be related to a late-glacial shore line.

Moraine ridge. Ridge of till and/or waterlaid sediments interpreted to have formed in marginal zone of glacier.

Area where lacustrine sediments are overlain by sand dune deposits that are about 12 m (36 ft) thick.

General direction of dip of foreset beds in Raymond Neck delta.

Inferred approximate ice-frontal position at time of deposition of designated meltwater deposits.

Approximate location of the front edge of the submerged Songo River Delta in modern Sebago Lake. Interpreted from 1964 aerial photographs.